

To: Bill Shaffer

From: Jim Goddard

Subject: Improving IB Joint Tolerances and Strength to
Achieve WT Joint Performance

Comments:

1. Resin Reinforcement / Additives – With the resin requirements in the proposed AASHTO M294M specification, adding fillers to the resin would be just about impossible. Getting a specification change to permit such additives probably could not be done in the next ten years, given the current AASHTO climate. I see no way to limit such materials just to the bells.
2. Resin Requirements – With the new (proposed) resin requirements in AASHTO M294M, the resins used should be more uniform, and, therefore, more consistent in terms of shrinkage (maybe).
3. Larger gaskets – The down-side to larger gaskets may be greater insertion forces, leading to customer complaints and pipe damage in the field. It is a narrow line we have to walk.
4. Electro-Fusion Joints – These might be appropriate for certain applications, but are expensive and represent a process unknown to the common storm sewer installer.
5. Thicker bells – To determine the required wall thickness to resist elongation under some given internal pressure the standard equation is:

$$t = pd / 2s$$

where: t = wall thickness (in.)
 p = pressure (psi)
 d = outside diameter (in.)
 s = allowable stress (psi)

Because the required tests take time under pressure, and because PE is a viscoelastic material, I would suggest using 1,000 psi as the allowable

stress (s). Given that, and the requirement to pass 10.8 psi internal pressure, the minimum bell thicknesses, with a safety factor of 2, would be:

Diameter	Bell Outside Diameter	Wall Thickness
inches	inches	inches
12	14.46	0.1562
15	17.57	0.1898
18	21.20	0.2290
24	27.20	0.2938
30	35.12	0.3793
36	41.60	0.4492
42	47.70	0.5152
48	54	0.5932
60	66	0.7128

Even at these thicknesses, at 10.8 psi the elongation in the bell will be 0.5%.

6. Adding a post forming reinforcing ring of fiberglass or some similar material might be the best answer. We should try this. There are issues:
 - a. will the bells continue to shrink after the reinforcing ring is installed?
 - b. Cost?
 - c. Production issues?
7. Redefining "watertight" would not be easy, nor would it be widely accepted.

These are my very quick comments.

cc: Tom King